#### RESIDENTIAL CODE CHANGE HIGHLIGHTS\*

During the 2002 calendar year, Builders may choose to use *Vol. VII – Residential Building Code*, 1997 Edition with '98 & '99 revisions, or they may use the *North Carolina Residential Building Code*, 2002 Edition. Volume VII is based on the 1995 CABO Model Code and the 2002 Code is based on the 2000 International Residential Code. Beginning January 1<sup>st</sup>, 2003 only the *North Carolina Residential Building Code*, 2002 Edition may be used. All Code references are to the *North Carolina Residential Building Code*, 2002 Edition unless followed by (Vol. VII), indicating a reference to *Vol. VII – Residential Building Code*, 1997 Edition.

#### CODE CHANGE IMPACT RATING:

**♦** = MODERATE IMPORTANCE OR A NEW DESIGN TOOL

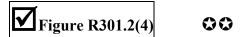
**②** ■ LIKELY TO EFFECT MOST BUILDERS

**♦ ♦ •** EFFECTS ROUTINE CONSTRUCTION PRACTICE CURRENTLY IN USE



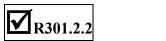
<u>Balcony</u>, <u>Exterior</u>: A <u>BALCONY</u> is an exterior floor projecting from and supported by a structure without additional independent supports. Contrast this with the definition for a <u>DECK</u>, which is supported on at least two opposing sides by an adjoining structure and or posts, piers, or other independent supports. The minimum live load design criteria differs in that a deck shall be designed for 40 psf live load and a balcony must be designed for a minimum 60 psf live load. See **Table R301.4**. Since balconies are cantilevered floor sections, their construction is limited by **Appendix P**. Cantilevered deck joists are limited to 24" per the **new Section #9 in Appendix "M"**.

Residential Building Type: In the new code, there are separate classifications for one- and two-family dwellings (**Type A-1**) and townhouses (**Type A-2**). This impacts energy efficiency compliance criteria for allowable glazing area. Glazing area shall not exceed a maximum 15% of gross area of exterior wall for A-1, and 25% for Type A-2. See Section **N1101.2.1**.



Basic Design Wind Speed: Buncombe County is now classified as a "special mountain region". The basic design wind velocity is **90 mph** for mountain regions with elevations less than or equal to 2700 above MSL (mean sea level). If you are building near a mountain top, verify the elevation of the building site. From 2700 ft. to 3000 ft., the minimum wind design increases to 100 mph. This change is a significant increase from the previous 70 mph wind design requirement (Table 301.2b, Vol. VII). Note that there are some locations within the City limits that are greater than 2700 feet above sea level, such as Patton and Town Mountains.

<sup>\*</sup> This list contains only the most significant code changes and is not a complete list of all the residential code changes.



Seismic Design Provisions: Detached one- and two-family dwellings located in Seismic Design Category C are exempt for the requirement of this code (footnote in **Figure R301.2(2)**). According to **Figure R301.2(2)**, Buncombe County is in Seismic Design Category C. Townhouses would have to comply with the requirements of **R301.2.2**. This will impact design for anchored stone and masonry veneer, allowable dead loads for building components, masonry construction, cantilevered floors, covered porches and other irregular features of the structure.

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Minimum Ceiling Height: Habitable rooms shall have a ceiling height of not less than 7 feet. The previous minimum ceiling height for habitable rooms was 7'-6" (305, Vol. VII).

#### R308.4(8)

Windows Located in Vicinity of Swimming Pools, Hot-tubs, or Spas – Hazardous Glazing Classification: This section identifies an addditional hazardous location for the purposes of glazing. This location includes glazing in walls and fences enclosing indoor and outdoor swimming pools, hot-tubs, and spas where the bottom edge of the pool or spa side of the glass is less than 60 inches above the walking surface and within 60 inches horizontally of the water's edge. This will have a major effect on hot-tub installations on decks where there are existing windows within 60 inches of the hot-tub.

# R308.4(9)

<u>Windows Located in Vicinity of Stairway – Hazardous Glazing Classification</u>: This section identifies an additional hazardous location for the purposes of glazing. This location includes glazing in walls enclosing stairway landings or within 60 inches of the top and bottom of stairways in the direction of travel within 60 inches above the walking surface. According to the exception, glazing where the bottom edge is more than 60 inches above the walking surface is exempt.

#### **✓**R309.1.1

Garage Duct Penetrations: Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage sheet metal or other approved material and shall have no openings into the garage. This is a new code section that will effect warm-air furnace installations within garages. All duct within the garage must be metal, but once the duct penetrates the garage wall into the dwelling it can change over to flex or duct board. As an alternate method, where duct openings are installed within the garage, an approved fire damper or ceiling damper shall be installed where the ductwork penetrates the fire resistant construction.

#### **✓**R309.4

<u>Carport Floor Surfaces</u>: Carports are distinguished from garages in that carports shall be open on at least two sides. Under Section **R309.4**, carport floor surfaces shall be approved noncombustible material. Asphalt surfaces may be permitted at ground level in carports. The floor shall slope to facilitate movement of liquids to a drain or toward the main vehicle entry

doorway. Dirt or gravel are not approved floor surfaces for carports. Concrete or asphalt are approved carport surfaces.



Emergency Egress Required in Basements with Habitable Spaces: Basements with habitable spaces shall have at least one openable emergency escape and rescue window or exterior door opening for emergency escape and rescue. This is similar to the requirements for bedrooms. This new requirement will make is necessary to provide direct egress from a basement foundation with habitable space. Refer to the definition of "habitable space" in Section 202. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a <u>bulkhead enclosure</u>, the bulkhead enclosure shall comply with Section R310.3.

## **☑**R310.2

<u>Window Wells</u>: Volume VII had only limited provisions to allow egress and rescue windows for bedrooms located below grade. Window wells are now addressed in Section **R310.2**. Window wells are now required for escape and rescue windows with a finished sill height below the adjacent ground elevation. This section of the code describes the construction requirements for the window well plus the ladder or steps to be used for egress or rescue.

#### **☑**R311.2

Exit Door Lock or Latch: All interior egress doors and a minimum of one exterior egress door shall be readily openable from the side which egress is to be made without the use of a key or special knowledge or effort. This code change would apply to an attached garage where the door to the house is the sole means of egress and the door locks from the inside the dwelling. In order to provide security for the dwelling and meet the requirements of **R311.2**, an egress door would need to be provided on an exterior wall of the garage.

#### **✓**R314.2.1

<u>Open Risers in Stairways</u>: Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter sphere. This applies to stairs with a total rise of greater than 30 inches. **There is no exception for exterior stairs, including deck stairs**.

## **☑**R317

Smoke Alarms: Smoke alarm requirements were previously referenced to the Electrical Code. Now Section **R317** prescribes smoke alarm requirements that are the same as those found in Section 210-71 of the 2002 N.C. Electrical Code. It should be noted that is a change from the previous code. There are certain conditions in alterations, repairs, and additions where smoke alarms shall be installed throughout the existing dwelling. These conditions are described in Section **R317.1.1**.



<u>Supporting Construction for Fire-Resistant Floor Assemblies in Duplexes</u>: Not previously in the residential code, **this change will have a major impact on fire resistant design in duplexes** 

where the dwelling units are stacked vertically. When floor assemblies are required to be fire-resistance-rated, the supporting construction of such assemblies shall have an equal or greater fire-resistive rating. All load-bearing walls, exterior and interior, that hold up the floor/ceiling between lower and upper level units will now be required to have 1-hour fire resistance in addition to the separating floor/ceiling assembly.



Sound Transmission: This section directly references **Appendix "K"** with regard to sound transmission requirements. Wall and floor-ceiling assemblies separating dwelling units shall provide airborne sound insulation for walls, and both airborne and impact sound insulation for floor/ceiling assemblies. In addition to meeting the fire-resistance design, walls and floor/ceilings will have to meet the requirement for sound transmission. Walls and floor/ceilings separating dwelling units shall meet a sound transmission class (**STC**) rating of 45 when tested in accordance with ASTM E 90. Floor/ceiling assemblies separating dwelling units or between a dwelling unit and a public or service area within the structure shall have an impact insulation class (**IIC**) rating of not less than 45 when tested in accordance with ASTM E 492. **When selecting a UL 1-hour fire resistant design check for the STC and IIC rating.** 



<u>Premise Identification – Site Address</u>: Approved numbers or addresses shall be provided for all new buildings in such a position as to be plainly visible and legible from the street or road fronting the property. These numbers should contrast with their background and be Arabic numerals or alphabet letters. The minimum size for address numbers is 4 inches high with a minimum stroke width of 0.5 inch.



Flood Resistant Construction: This section provides prescriptive design for buildings or structures constructed in the floodplain or flood hazard areas. Buildings within the actual floodway shall meet the provisions of the *International Building Code*. For those areas identified as "A" zones, which are prone to flooding but not subject to high velocity wave action, prescriptive design requirements are listed under section **R327.2**. Section **R327.2.2** includes a non-engineered design for foundations to allow floodwaters to flow through the foundation. Prescriptive design is given in **R327.2.3** for the foundation construction. See also Chapter 45 for additional flood plain construction standards.



Anchor Bolts for Exterior Walls and Sill Plates: Foundation anchor bolts are now required in all cases, regardless of the height of unbalanced fill. Previously, foundation systems with more than 30" of unbalanced fill were required to have anchor bolts (Figure 403.1a(5), Vol. VII). The wood sole plate at exterior walls on monolithic slabs and wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet on center. Anchor bolts shall also be located within 12 inches from ends of each plate section, not just 12" from the corner or end of each wall, as was previously required. An exception to this section allows for the use of foundation anchor straps, spaced as required to provide equivalent anchorage to ½-inch-diameter anchor bolts. The designer shall provide documentation to demonstrate equivalent anchorage.

# **Table R404.1.1(1)**



Plain Concrete and Plain Masonry Foundation Walls: This table is similar to the previous Table 404.1.1a (Vol. VII). It has been expanded to include foundation wall heights up to a maximum of 9 feet. Another change is that a soil classification for the building site must now be assumed before this table can be used. The Unified Soil Classification System is contained in **Table R405.1**.

#### **Tables R404.1.1(2), (3), and (4)**



Reinforced Concrete and Masonry Foundation Walls – 8", 12", and 10" Block: These new tables now provide prescriptive empirical designs for reinforced masonry foundation walls for foundation walls up to a maximum height of 9 feet with various levels of unbalanced fill. These tables could be helpful tools for design. Note that footnote "b" permits alternative reinforcing bar sizes and spacing having an equivalent cross-sectional area of reinforcement per lineal foot of wall, provided that the spacing of the reinforcement does not exceed 72 inches.

# **1** R404.1.3(2)



Retaining Walls: Retaining walls supporting more than 48 inches of unbalanced backfill that do not have permanent lateral support at the top and bottom shall be designed in accordance with accepted engineering practice. Previously, the threshold for requiring engineering for unsupported retaining walls was 5 feet.

# **1**R404.1.6



<u>Foundation Height Above Finished Grade</u>: Concrete and masonry foundation walls shall extend above the finished grade adjacent to the foundation at all points a minimum of 4 inches where masonry veneer is used and a minimum of **6 inches** elsewhere. Previously, Section 404.1.3 (Vol. VII) required a minimum of 8" foundation extension above finished grade.

#### **1**R404.4



Insulating Concrete Form Foundation Walls (ICF): This is a completely new section that provides empirical design for ICF wall construction. When the provisions of this section are used to design insulating concrete form foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design unless otherwise required by state law of the jurisdiction having authority. This section provides designs for flat, waffle grid, and screen-grid ICF walls. An important issue with ICF construction is the termite hazard created by installing foam plastic below grade. Section **R404.4.7.2** addresses termite hazards and provides conditions for acceptance. It is not clear at this time what would be considered an approved method of protecting the foam plastic and structure from subterranean termite damage. Refer also to new language under Section **R406** that addresses both prohibited and permitted materials to be used for waterproofing on ICF walls.

#### **✓** R408.1



<u>Crawl Space Ventilation</u>: In addition to the requirement for a minimum net area for ventilation openings, the new code requires at least one vent within 3 feet of each corner, regardless of whether or not vapor barrier is being used. Previously, Section 409.1 (Vol. VII) required a

vent within 3 feet of each corner only when using the exception allowing a reduction of the total vent area by providing a ground vapor barrier. The maximum size of the least dimension of the screen or grills has been increased from 1/8" to 1/4".



<u>Decks – Required to be Positively Anchored to the Primary Structure</u>: **Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting**. This is a new code section. This section will be applicable to new deck additions to existing dwellings where it is not possible for the inspector to verify positive connection.

# Tables R502.3.1(1) and R502.3.1(2)

Floor Joist Spans For Common Lumber Species: These new span tables are much easier to use than the previous Tables 502.3.1a & b (Vol. VII). You no longer have to determine the modulus of elasticity or the bending stress found previously in Table 502.3.1c (Vol. VII). The only information required now is the species, grade, and joist spacing in order to select a joist size for a given span. Note that Table **R502.3.1(1)** is for 30 psf live load and 10 psf dead load, and it is to be used only for residential sleeping areas and attics that are accessed by means of a fixed stairway. Table **R502.3.1(2)** is for 40 psf live and 10 psf dead load, and it is to be used for residential living areas.

## **▼** Table R502.5(1)

Girder and Header Spans for Interior and Exterior Load Conditions: This table is a combination of the previous Volume VII Girder Tables 502.3.3(a),(b), & (c) and Header Design Charts 602.6(a),(b), & (c). It may be unclear when using this new chart where exactly the particular header or girder is located. The previous Vol. VII header tables had sketches making it clear which members are actually being sized. For clarification, refer to the drawings in Table 602.6(a) (Vol. VII), where the five categories for header support are clearly illustrated. These sketches should be carried over to the same header support categories in the new **Table** R502.5(1). By comparison to the previous header tables, the new Table R502.5(1) makes no distinction in how the header is assembled, with or without a structural flitch plate. Nor does this new table specify a grade for the header material. The allowable header spans are more conservative than in the previous tables for the same header member size. There is no way to use this table to size an interior girder or header. Table R502.5(1) which is supposed to be used for sizing interior headers and girders has been deleted in the NC 2002 Code. An approved alternative would be to continue to use the Volume VII Girder Tables 502.3.3(a),(b), & (c) to size interior girders, or refer to Appendix "N" in the 2002 NC Residential Code for basic load estimating.

#### **✓** Table R502.5(1)b

Jack Stud Requirements for Header Spans For Interior and Exterior Load Conditions: Figuring the minimum number of jack studs has become more complicated. The previous Section 602.6.3 (Vol. VII) required one jack stud at each end for headers spanning between 3 ft. and 6 ft., and two jack studs for headers more than 6 ft. wide. Now, footnote #1 of Table **R502.5(1)** states that the number of jack studs required at each end of a header shall be determined from Table **502.5(1)b**. This table is set up similar to Table **R502.5(1)** with five different load conditions.

The number of jack stud varies with the header span and the header width. Note that according to footnote #1, **this table is based on a roof span (W) of 36 feet**. For other roof spans, the tabulated number of jack studs required at each end of the header shall be multiplied by  $(W/48 + \frac{1}{4})$ , where "W" = the roof span.



Notching of Structural Members: The tension side of members that are 4 inches or greater in nominal thickness shall not be notched except at the ends of the members. In a typical loading condition the tension side of a floor joist or rafter is on the bottom edge. Another code change regarding notching of joists, rafters, and beams, limits the length of allowable notches along a member. The previous code did not address this limitation. Now notches shall not be longer than one-third of the depth of the member. The separation distance between individual notches and holes are now limited to a minimum of 2 inches. The previous code did not address this issue.

#### **✓**R502.11

Wood Truss Design: Section **R502.11.1** requires that the **truss design drawings shall be prepared by a registered design professional.** Section **R502.11.4** requires that these **drawings shall be provided to the building official** and this section lists what **minimum information must be included in the drawings**. Previously, Section 502.10 (Vol. VII) only required that wood floor trusses be designed in accordance with approved engineering practice and there were no specific requirements for drawings.

### **☑**<sub>R505</sub>

<u>Steel Floor Framing</u>: This is an entirely new section of the code that specifically addresses steel floor framing. The provisions of this section shall control the construction of steel floor framing for buildings not greater than 60 feet in length perpendicular to the joist span, not greater than 36 feet in width parallel to the joist span, and not greater than two stories in height, with each story not greater than 10 feet high.

## **✓** Table R602.3(1)

Nailing at Braced Wall Panels: There is a new fastening specification that applies to the connection of the sole plate to joist or blocking at a **braced wall panel**. The sole plate shall be nailed with 3 – 16d nails at 16" on center. Braced wall panels are discussed in **R602.10.1** and are used for wind or seismic bracing. The length of braced wall panels is 48" or 96" depending on which method is used under Section **R602.10.4** and **R602.10.5**. Per Section **R602.10.8**, braced wall panel sole plates shall be fastened to the floor framing, and top plates shall be connected to the framing above in accordance with **Table R602.3(1)**. This table does not appear to specify any special stud-to-top plate connection for braced wall panels, other than the regular 2-16d end nails.



<u>Stud Spacing – Bearing Walls > 10 Feet High</u>: This table applies to wind speeds of 100 mph or less. Previously, under Vol. VII, a bearing stud height greater than 10 feet required that the wall be designed by a professional designer. In Section **R602.3.1** of the new code, in bearing walls

with studs that are more than 10 feet in height the studs shall be spaced not more than specified in **Table R602.3.1**. Although this new table is somewhat helpful for empirical design of bearing stud walls greater than 10 feet in height, it is severely limited in its applicability. **Footnote "b" states that the table is limited to conditions where the tributary dimension for floors and roofs does not exceed 6 feet, and the maximum span for floors and roofs cannot exceed 12 feet.** Usually in "Great Rooms" where taller bearing walls are typically used, the tributary roof dimension usually exceeds 6 feet. Again, when the conditions are not within the parameters of footnote "b", then design is required.



<u>Fireblocking in Duplexes</u>: Section **R602.8(6)** now requires that fireblocking be installed in cornices of two-family dwellings in line with the dwelling unit separation. Although this is prudent design, it was not specifically addressed in Vol. VII.

# **▼** Table R602.10.3

Wall Bracing: Lateral bracing has changed in the new code. According to Section R602.10.1, the amount and location of bracing shall be in accordance with Table R602.10.3 and the amount of bracing shall be the greater of that required by the Seismic Design Category or the design wind speed. There are now limits to how far the first braced wall panel can be placed from the end of the wall. The depth of any offsets in an exterior wall will determine if each of the wall segments should be treated separately in terms of the placement of wall bracing. When using **Table R602.10.3**, there is a dilemma in which column to use. Asheville, being in the 90 mph wind zone now, would fall under the top column for wind design of 100 mph or less. But the Seismic Design Category for Buncombe County is Category C, which would drop into the second column based on Seismic Design Category. But remember that detached one- and twofamily dwellings located in Seismic Design Category C are exempt from the seismic requirements of this code per the exception in Figure R301.2(2). Therefore, use the top column of Table R602.10.3 for wall bracing in detached one- and two-family dwellings, and use the second column of Table R602.10.3 for townhouses. Note that in either case there is now a minimum percentage of braced wall length and the percentage depends on the method of wall bracing that is being used. The previous Table 602.9 (Vol. VII) was much simpler, although it did not take into consideration any seismic design. Builders who typically use o.s.b. sheathing on the entire exterior of the wall framing should be aware of **Table R602.10.5**. This new table provides the length requirements for braced wall panels in a continuously sheathed wall. Wood structural panels installed at corners shall be installed in accordance with Figure R602.10.5.



Steel Wall Framing: This is a whole new section of the code dealing with the empirical design of cold-formed steel wall framing members. As with the steel floor framing found in Chapter 5, the use of this design is applicable only for buildings not greater than 60 feet in length perpendicular to the joist or truss span, not greater than 36 feet in width parallel to the joist or truss span, and not greater than two stories in height with each story not greater than 10 feet high.

**☑**R611

<u>Insulating Concrete Form Wall Construction</u>: This is a new code section. When the provisions of this section are used to design insulating concrete form (ICF) walls, project drawings, typical

details and specifications are not required to bear the seal of a registered design professional. This section shall apply to the construction of ICF walls for buildings not greater than 60 feet in plan dimensions, and floors not greater than 32 feet or roofs not greater than 40 feet in clear span. Building shall not exceed two stories in height above grade with each story not greater than 10 feet high.

#### **☑**R703.7

Masonry Veneer in Seismic Design Category C: In Seismic Design Category C, exterior masonry veneer with a backing of wood or cold-formed steel framing shall not exceed 30 feet in height above the noncombustible foundation, with an additional 8 feet permitted for gable ends. In other than the topmost story, the length of the wall bracing shall be 1.5 times the length otherwise required in Chapter 6. See **Table 602.10.3** for the length of bracing requirements. Section **R703.7** is a new code section. Remember that seismic design does not apply to detached one- and two-family dwellings. It would apply to townhouses.

#### **✓**R703.8

Aluminum Flashing Prohibited for Certain Applications: Aluminum flashing may not be used in contact with cementitious material, except as counter flashing. In **Appendix "M"**, aluminum flashing is prohibited in conjunction with deck construction. **Section R703.8** lists specific locations where corrosion-resistant flashing is required. These locations include flashing over windows and doors; chimney intersections; under and at ends of masonry, wood, or metal copings; over projecting wood trim; at porch, deck, and stairway attachments to wood-frame construction; at wall and roof intersections; and as built-in gutters.

# **✓**R703.9

<u>Exterior Insulation Finish Systems (EIFS)</u>: Previously permitted as an alternate method and material under Section 108 (Vol. VII), EIFS is now addressed in Section **R703.9**. Non-drainable EIFs shall not be permitted.

## **☑** R802.4

Allowable Ceiling Joist Spans: Spans for ceiling joists shall be in accordance with **Tables R802.4(1)** and **R802.4(2)**. These new span tables are much easier to use than in the previous Tables 802.4a, b, c, &d (Vol. VII). You no longer have to determine the modulus of elasticity or the bending stress found previously in Table 502.3.1c (Vol. VII). The only information required now is the species, grade, and the ceiling joist spacing in order to select a joist size for a given span. Note that **Table R802.4(1)** is for 10 psf live load and 5 psf dead load, to be used in uninhabitable attics without any possibility of storage. Table **R802.4(2)** is for 20 psf live load and 10 psf dead load, to be used for uninhabitable attics with limited storage.

#### **☑**<sub>R802.5</sub>

Allowable Rafter Spans: Spans for rafters shall be in accordance with **Tables R802.5.1(1)** through **R802.5.1(8)**. These new span tables are much easier to use than in the previous Tables 802.4e through 802.4s (Vol. VII). You no longer have to determine the modulus of elasticity or the bending stress found previously in Table 502.3.1c (Vol. VII). The only information required now is the species, grade, and the rafter spacing in order to select a rafter for a given span. To

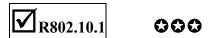
select which table to use, one needs to know the ground snow load and the live load deflection criteria. Note that **Table R802.5.1(1)** is to be used when a ceiling is not attached directly to the rafters, for a roof live load of 20 psf and a maximum deflection of **L/180**. Table **R802.5.1(2)** is used when a ceiling is attached to the rafter, for a roof live load of 20 psf and a maximum deflection of **L/240**. These are the two table to be used for minimum code compliance for North Carolina. Note also that footnote "a" refers to a condition where the ceiling joists or rafter ties are located higher in the attic space. In that case the tabular rafter spans shall be multiplied by a rafter span adjustment factor based on the ratio between the height of the ceiling joist or rafter ties above the top plate and the height of the roof ridge above the top plate. This is a useful method to properly size rafters where the ceiling joists in an elevated tray ceiling are nailed to the side of the rafters at a point above the plate line.



Cutting and Notching - Rafters: This section is similar to the previous Section 802.6 (Vol. VII), except that it limits the length of notches to no longer than one-third the depth of the member. In addition, the tension side of members 4 inches or greater in nominal thickness shall not be notched except at the ends of the members. Additional code language prohibits placing a hole within 2" of any other hole or notch. The **Exception** to Section **R802.7.1** addresses an issue not previously covered in Vol. VII. The exception permits notches in cantilevered portions of rafters (rafter tails), provided the dimension of the remaining portion of the rafter is not less than 4-inch nominal and the length of the cantilever does not exceed 24 inches.



<u>Framing of Openings – Dormers</u>: All dormers shall have double headers and double trimmers.



Wood Truss Design: Section R802.10.1 requires that truss design drawings shall be prepared by a registered design professional. This section also requires that these drawings shall be provided to the building official and lists what minimum information must be included in the drawings. Previously, Section 802.11 (Vol. VII) required only that wood trusses be designed in accordance with approved engineering practice and there were no specific requirements for the drawings.

### **☑**R802.11

Roof Tie-Down: Roof assemblies subject to wind uplift pressures of 20 pounds per square foot or greater, as estabished in **Table R301.2(2)**, adjusted for height and exposure per **Table R301.2(3)**, shall have rafter or truss ties provided at bearing locations in accordance with **Table R802.11**. Wind uplift pressure on roof assemblies shall be determined using an effective wind area of 100 s.f. and Zone 1 in **Table R301.2(2)**. Based on an the Exposure Category definitions in **Section R301.2.1.4**, Exposure B occurs in urban or suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure C is open terrain with scattered obstructions having heights generally less than 30 feet extending more than 1500 feet from the building site in any quadrant. Generally, **Exposure C applies to most cases**.

Example: Consider a two-story dwelling with a mean roof height of 25 feet located in Exposure Category C and having a roof pitch of 6/12 (26° roof slope). The height and exposure

adjustment coefficient for this example is 1.35 from **Table R301.2(3)**. Using an effective wind area of 100 s.f. for Zone 1, and a roof pitch >10° to 30° for 90 mph basic wind speed, **Table R301.2(2)** yields a wind pressure load of 10.0 psf on the windward side of the roof, and –12.1 psf on the leeward of the roof. Even with these pressures adjusted for Exposure C (13.5 psf and 16.3 psf), the wind uplift pressures are still less than 20 psf. Generally, compliance with **Table 802.11**, would not be required in a 90 mph wind zone unless the building is very tall. Previously, Section 802.12 (Vol. VII) gave the tie-down nailing requirements for trusses as the same for both rafters and ceiling joists in the fastening schedule in Chapter 6. As a practical matter, the use of approved hurricane Z-clips is a prudent way to provide sufficient tie-downs nailing without damaging the truss.

## **☑** R804

Steel Roof Framing: This is an entire new section of the code that specifically addresses steel roof framing. The provisions of this section shall control the construction of steel roof framing for buildings not greater than 60 feet in length perpendicular to the joist, rafter, or truss span, not greater than 36 feet in width parallel to the joist span or truss, and not greater than two stories in height, with each story not greater than 10 feet high, and roof slopes not smaller than 3:12 or greater than 12:12.

#### **☑**<sub>R807</sub> **○ ○**

Attic Access: Per Section R807.1, an attic access opening shall be provided to attic areas that exceed **30 square feet** and have a **vertical height of 30 inches or greater**. Previously, Section 807.1 (Vol. VII) did not specify a minimum attic area. The rough-framed opening shall not be less than **22 inches by 30 inches** and shall be **located in a hallway or other readily accessible location**. The previous opening size required by Vol. VII was 20 inches by 30 inches. When mechanical equipment is located in the attic space, the minimum opening size shall compy with the Mechanical Code.

# **☑**R808

Attic Insulation Clearance: This section is a new section in the residential code. It comes from the electrical code. Combustible insulation shall be separated a minimum of <u>3 inches</u> from recessed lighting fixtures, fan motors and other heat-producing devices. There is an exception for devices listed for lesser clearances, installed in accordance with conditions stipulated in the listing.

## **☑** R903.4

<u>Roof Drainage – Flat Roofs</u>: Unless a roof is sloped to drain over the roof edges, roof drains shall be installed at each low point of the roof. Section **R903.4.1** specifies the location of overflow drains (secondary drains) or overflow scuppers. The installation and sizing of overflow drains, leaders and conductors shall comply with the Internation Plumbing Code.



<u>Reroofing</u>: Per Section **R907.3**, new roof coverings shall not be installed without first removing existing roof coverings where the existing roof has <u>two or more</u> applications of any type of roof covering. Previously, Section 910.3 (Vol. VII) required removal of existing roof covering

where there were three or more layers already on the roof. To paraphrase, this means that under the new code the maximum number of layers of roofing is two, instead of three layers.

## ✓ N1101.2.1&2

Maximum Glazing Area: Compliance for A-1 (detached one- and two-family) dwellings shall be demonstrated by meeting the requirements of Chapter 11 with a glazing area that does not exceed 15 percent of the gross wall area of exterior walls. Compliance for A-2 (townhouse) dwellings shall be demonstrated by meeting the requirements of Chapter 11 with glazing area that does not exceed 25 percent of the gross area of exterior walls. An alternate method is to meet the requirements of the *International Energy Conservation Code* for Type A-1 and Type A-2 buildings.

## ✓ N1101.3.1

<u>Insulation Markers – Blown Insulation</u>: Where blown-in or sprayed insulation is applied in the roof-ceiling assembly, the installer shall provide a certification of the initial installed thickness, settled thickness, coverage area, and the number of bags of insulating material installed.

<u>Markers</u> shall be provided for every 300 square feet of attic area, attached to the trusses, rafters, or joists and indicate in 1-inch high numbers the installed thickness of the insulation.

#### **✓**N1101.3.2

Fenestration (glass in windows/doors): Fenestration shall be labeled and certified by the manufacturer. The fenestration labeling shall contain the product's U-factor in accordance with NFRC 100, and the solar heat gain coefficient (SHGC) in accordance with NFRC 200, and air leakage in accordance with AAMA/WDMA. When a manufacturer has not determined a fenestration product's U-factor, SHGC, or air leakage, then default values shall be assigned using the *International Energy Conservation Code*. Note that Section N1102.1 permits up to 1% of the total glazing area to be exempt from U-factor requirements.

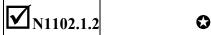
# ✓<sub>N1102.1</sub>

Thermal Performance Criteria – Simplified Prescriptive Criteria: The minimum required insulation R-value or maximum required U-factor for each element in the building thermal envelope (fenestration, roof/ceiling, opaque wall, floor, slab edge, crawl space wall and basement wall) shall be in accordance with the criteria listed in **Table N1102.1**. According to **Table N1102.2**, Buncombe County is located in **Climate Zone #9**. Use Zone 9 in **Table N1102.1** to find the minimum prescriptive building envelope thermal component criteria. For Zone 9, the maximum glazing U-factor is 0.45. The minimum ceiling insulation for Zone 9 is R-38 (Vol. VII was R-30). See Section **N1102.1.2**, for an exception when energy efficient roof trusses are used. Minimum wall insulation for Zone 9 is R-13 (Vol. VII required an additional R-1 sheathing). Minimum basement wall insulation is R-8 and crawl space wall insulation is R-11, where these components are part of the thermal envelope. The floor and slab perimeter insulation remains the same as previously required in Vol. VII.

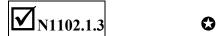
## ✓<sub>N1102.1.1.2</sub>

<u>Steel-frame Walls – R-Values</u>: The minimum required R-values for steel-frame walls shall be in accordance with **Table N1102.1.1.2**. According to **Table N1102.1.1.2**, the equivalent

prescriptive insulation for Zone 9 is R-11 wall cavity insulation plus R-9 sheathing; R-15 wall cavity insulation plus R-8 sheathing; or R-21 wall cavity insulation plus R-7 sheathing.



<u>Ceiling Insulation for Energy Efficient Truss Design</u>: The R-38 ceiling insulation required in **Table N1102.1** is based on the assumption that standard truss or roof construction is being used, where the clearance at the exterior wall plate line prohibits a full R-38 extending to the exterior wall line. Per Section **N1102.1.2**, where the construction technique (raised heel trusses) allows the required R-value of ceiling insulation to be obtained over the wall top plate, R-30 is permitted to be used where R-38 is required in **Table N1102.1**.



<u>Opaque Doors</u>: Opaque doors separating conditioned and unconditioned space shall have a maximum U-factor of 0.35. One opaque door shall be permitted to be exempt from this U-factor. Previously, Section 3905.1 (Vol. VII), required all unglazed doors within heated space and exposed to the exterior to have a minimum R-value of R-1.66 (or maximum U-0.60).



<u>Floors Exposed Directly to Outside Air</u>: Whenever over 25% of the conditioned floor area of any individual floor assembly is exposed directly to outside air, then it shall be insulated to meet the requirements for a ceiling. For Zone 9 that would be R-38 per **Table N1102.1**. This would apply to dwellings or additions to dwellings that are constructed on columns or piers without an enclosing foundation.

#### **☑**N1102.1.5

Basement Walls: When insulating basement walls, the required R-value shall be applied from the top of the basement wall to a depth of 10 feet below grade or to the top of the basement floor, whichever is less. Because the rim joist between floors is part of the building envelope, this must be insulated also if the basement is conditioned. Previously, Vol. VII did not address the depth to which basement wall insulation was to be installed. Each wall of a basement must be considered separately do determine if it is a basement wall or an exterior wall. According to the 2000 IRC Commentary, a basement wall is defined as having an average gross wall area that is 50% below grade. A wall that is less than 50% below grade is an exterior wall and must meet the insulation requirements for walls. For Zone 9, a basement wall that is part of the thermal envelope shall be insulated with minimum R-8 insulation. If the basement wall is more than 50% exposed above grade, then Table N1102.1.1.1(1) could be used for concrete masonry basement walls with the insulation installed on the exterior side or integrally within the cells (R-8.9); or on the interior side of the wall (R-10.9)

## **✓**N1102.1.6

<u>Slab-on-Grade Floors</u>: Slab insulation is now required only where the top edge of the slab is above finished grade down to 12 inches or less below finished grade. For Zone 9 the requirement is 2 feet of R-5 perimeter insulation (R-7 for internally heated slabs). The major change here is the specification for when slab insulation is required, based on depth with respect to finished grade. Where the top of the slab is more than 12" below finished grade, no

perimeter slab insulation is required by code when using prescriptive compliance. By an exception, slab perimeter insulation is not required for unheated slabs in areas of moderate to very heavy termite infestation probability. North Carolina is in an area of moderate to heavy termite infestation probability per **Table R301.2(1)**. Where this exception is used, building envelope compliance shall be demonstrated using the *International Energy Conservation Code*, Section 502.2.2 (using ASHRAE Handbook of Fundamentals total thermal heat gain or loss calculations), or Section 502.2.4 (by taking advantage of total window area less than 15%).



<u>Duct Insulation</u>: All portions of the air distribution system shall be insulated to an installed R-5 when system components are located within the building, but outside of conditioned space, and R-8 when located outside of the building. When located within the building envelope assembly, at least R-8 shall be applied between the duct and that portion of the assembly furthest from conditioned space.



Radon Control Methods: This appendix is informative and is not a part of the Code. According to **Table AF101(1)**, Buncombe County is listed as having a high radon potential (Zone 1).



<u>Deck Band Flashing</u>: Aluminum flashing may not be used in conjunction with deck construction. Previously, Appendix A (Vol. VII) did not specifically prohibit aluminum flashing for deck construction.



Cantilevered Deck Floor Joists: Specific construction details are now codified for cantilevered deck joists. The joists must be at least S.Y.P. 2x10s @ 16" o.c., and no stair stringers or platforms can be supported by the cantilevered floor joists. Joists must be toe-nailed to the support girder. The maximum cantilevered distance is 24", and no roof loads are permitted on the cantilevered section.

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